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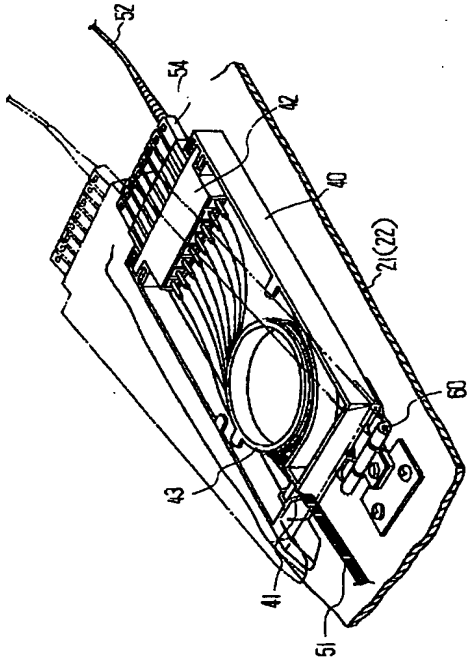
(54)【発明の名称】　光配線盤

(57)【要約】
【課題】　より多くの光接続部を高密度に収納でき、かつ作業性に優れる光配線盤を提供する。
【解決手段】　トレー21（22）と、一端から多芯光ファイバ芯線51が導入され、他端に機器側光ファイバ52の接続アダプタ42を有する複数の光接続モジュール40とを具える。光接続モジュール40は、接続アダプタ側を起こした状態に保持するように回動機構（ヒンジ60）を介してトレー21（22）に固定される。



【特許請求の範囲】
【請求項１】　トレーと、
一端が非分岐で、他端に単芯分岐された接続アダプタを有する多芯光ファイバ芯線を具える光接続モジュールとを具え、
前記光接続モジュールは、接続アダプタをトレー底面と平行にして前記トレー内に固定されることを特徴とする光配線盤。
【請求項２】　光接続モジュールは、接続アダプタ側を起こした状態に保持するように回動機構を介してトレーに固定されることを特徴とする請求項１に記載の光配線盤。
【請求項３】　前記トレー内に、線路側光ファイバと多芯光ファイバの非分岐端との融着接続部を保持するホルダを有することを特徴とする請求項１に記載の光配線盤。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、光ファイバケーブルを別の光ファイバに分岐・接続するための光配線盤に関するものである。特に、より多くの光接続部をコンパクトに収納できると共に、作業性にも優れる光配線盤に関するものである。
【０００２】
【従来の技術】光配線盤には、光接続部を単心ごと独立して接続するコネクタ型と、複数芯を一括して成端した接続アダプタを用いるモジュール型とがある。
【０００３】コネクタ型は、図８に示すように、収納ケース10内に融着接続部トレー5、センタートレー15および光接続部収納トレー20を下から順に具えている。線路側光ファイバ50（多芯光ファイバケーブル）は図の左側から導入され、装置側光ファイバ52を図の右側から引き出す構成である。
【０００４】ケース10内に導入された線路側光ファイバ50は融着接続部トレー5内に導入される。融着接続部トレー5内では、線路側光ファイバ50と分岐用光ファイバコード51′の非分岐端とを融着接続し、この接続部の前後に十分な余長を持って収納されている。融着接続部トレー5から引き出された分岐用光ファイバコード51′は、センタートレー15を通って収納トレー20へ図の左側から導入される。一旦センタートレー15を通して図の左側から収納トレー20に分岐用光ファイバコード51′を導入するのは、装置側光ファイバ52を図の右側から引き出して線路側光ファイバ50と区分するためである。
【０００５】図９に示すように、収納トレー20は上下二段に構成され、下段トレーの前方角部に位置する回転軸71により上段トレー21は回転自在に連結されている。これにより、上段トレー21をスライドするように回転して下段トレー22の前方に引き出すことができるように構成されている。
【０００６】分岐用光ファイバコード51′は、前記上下段トレー21、22内で十分な余長をとって収納され、その分岐端は各々独立したコネクタ90を介して単心の装置側光ファイバ52に接続されている。この光配線盤と同様の構成を開示する文献として、特開平10-339823号公報がある。
【０００７】一方、モジュール型は、例えば特開平11-133246号公報に記載のものがある。一般に、光接続モジュールは、薄いケース状のもので、モジュールケースは一端に非分岐の多芯光ファイバ芯線または多芯光ファイバコードの導入孔を有し、他端に単芯分岐された光接続アダプタを具えている。モジュールケース内に導入された多芯光ファイバ芯線（コード）は、余長をとってから単芯分岐されて接続アダプタに接続される。前記アダプタは装置側光ファイバをコネクタ接続できるように構成されている。
【０００８】通常、このようなモジュールは縦置きにして、すなわち接続アダプタを垂直方向沿いに向けて複数並列しておき、作業対象のモジュールのみを前方に引き出して機器用光ファイバを抜き差しするように構成されている。
【０００９】
【発明が解決しようとする課題】しかし、従来の光配線盤では、光配線盤に収納する光接続部の数を高密度化することが難しいと言う問題があった。
【００１０】＜コネクタ型の場合＞トレー内に分岐用光ファイバコード51′の大きな余長が必要な上、トレー内に単心ごとのコネクタ90を収納するため、余長スペースおよび各コネクタを抜き差しするための作業間隔が必要とされ、収納される光接続部の数が制約されるからである。また、融着接続部トレー5およびセンタートレー15の格納スペースが必要で、そのために光接続部収納トレー20の格納数が制約されることも高密度化の障害となる。
【００１１】＜モジュール型の場合＞アダプタを垂直方向に沿うように配置して前後に引出自在に構成するため、引き出し動作に対応するための十分な余長が必要である。そのため、大きな余長スペースが必要となり、光接続部の高密度収納が難しい。また、従来のモジュール型の場合でも融着接続部トレーが必要な点はコネクタ型の場合と同様である。
【００１２】従って、本発明の主目的は、より多くの光接続部を高密度に収納でき、かつ作業性に優れる光配線盤を提供することにある。
【００１３】
【課題を解決するための手段】本発明は、光接続モジュールを用い、このモジュールのトレー内における配置構造を工夫することで上記の目的を達成する。
【００１４】すなわち、本発明光配線盤は、トレーと光接続モジュールとを具える。光接続モジュールは、一端

が非分岐で、他端に単芯分岐された接続アダプタを有する多芯光ファイバ芯線を具える。そして、この光接続モジュールは、接続アダプタをトレー底面と平行にして前記トレー内に固定することを特徴とする。

【００１５】光接続モジュールを用いることで、単心ごとのコネクタをトレーに収納する場合に比べてより多数の光ファイバ接続部をトレー内に収納することができる。

【００１６】また、このモジュールをトレー内に固定することで、モジュールを前後に出し入れする必要がなく、この前後動に対応した分岐用光ファイバの余長も短縮できるため、余長スペースを削減してより一層の多芯収納を実現することができる。従来、コネクタ型の光配線盤では、融着接続部の前後、分岐用光ファイバコードの分岐個所の前後で大きな余長収納スペースを必要とする。本発明光配線盤では、光接続モジュールを用いることで、線路側光ファイバと多芯光ファイバ芯線との融着接続部の前後における余長をトレー内に収納することができ、余長収納スペースを削減することができる。

【００１７】さらに、アダプタが水平トレー底面と水平になる向きにモジュールを配置することで、各トレーを薄型に形成することができる。配置構造は、並列・縦列または両者の組合せのいずれでも構わない。

【００１８】ここで、接続アダプタには、単心の装置側光ファイバがコネクタ接続されるため、各装置側光ファイバコネクタをアダプタへ抜き差しする作業が必要となる。この作業が容易に行えるよう、接続アダプタとトレー底面との間には間隔をあけてモジュールを固定することが好ましい。この間隔は指を差し込める程度のサイズが好適である。この間隔の形成は、①接続アダプタ側が高くなるようにモジュール底面の縦断面をテーパ状にしたり、②接続アダプタ側が高くなるようにモジュール底面に支持部材を介在させたり、③トレー底面に凹部を形成することなどが挙げられる。一方、前記の間隔を形成しない場合、接続アダプタと装置側光ファイバのコネクタとの抜き差しは、コネクタの端部に係合する治具などを用いて行うことが好ましい。

【００１９】また、光接続モジュールは、接続アダプタ側を起こした状態に保持するように回動機構を介してトレーに固定することが好ましい。接続アダプタ側をトレー底面から起こすことができれば、装置側光ファイバコネクタの下方に指を差し入れる空間を形成でき、装置側光ファイバのコネクタを上下から指で挟んで抜き差し作業を容易に行うことができる。逆に、作業を行わないときは、モジュールをトレー底面に密接させてトレー内におけるモジュールの高さを最小に抑えることができ、トレー自体の厚みを小さくすることができる。

【００２０】接続アダプタ側を起こした状態に保持するには、ヒンジを用いることが好適である。ヒンジの中には、弾性材を用いて開閉動作をかたく設定したものと、開閉動作がスムーズに行われる通常のものとがある。前者を用いた場合は、何らの機構を用いなくとも、単に光接続モジュールを起こせば、その状態で保持される。一方、後者を用いた場合は、単に光接続モジュールを起こしただけでは元の倒された状態に復帰してしまうため、モジュールの下面に起倒自在の支持脚を配置して、この支持脚によりモジュールの起立状態を保持することが好ましい。

【００２１】光接続モジュールは、トレー内に単層で配置する。これにより、一段のトレーの厚みを小さくして、より多数段のトレーを配置することにより高密度収納を可能にする。

【００２２】また、トレー内には、線路側光ファイバと多芯光ファイバ芯線との融着接続部を保持するホルダを有することが好ましい。光接続モジュールを用いることで、融着接続部につながる余長をトレー内に収納することができる。そのため、従来必要であった融着接続部トレーとセントートレーも不要になり、融着接続部とレートセントートレーのスペース分にもモジュールを収納するトレーを配置して高密度収納を可能にする。すなわち、融着接続部トレーやセントートレーを通すことなく、線路側光ファイバを直接モジュールの収納トレーに導入することができる。

【００２３】本発明光配線盤における光接続モジュールの配置は、水平配置のトレーを前方に引き出した状態で切替作業を行う従来のトレー構造に適用することも可能であるが、３つの回転機構を具える積層構造のトレーに適用することが多芯収納化と作業性の観点から好ましい。

【００２４】この積層構造のトレーとは、主トレーと、主トレー上に積層した補助トレーとを具え、両トレーの各々には光接続モジュールが収納されるものである。そして、次の３つの回転機構を具える。

【００２５】①主トレーの前方を上下方向に回動するように主トレーの後端に沿った軸を回転軸とする第１回転機構。

②補助トレーを主トレーの前方に回動して引き出しできるように積層方向の軸を回転軸とする第２回転機構。

③補助トレーを主トレーの前方に引き出した状態で主トレーに対する角度を可変するように主トレーの前端に沿った軸を回転軸とする第３回転機構。

【００２６】このような積層構造のトレーを用いれば、トレーを積層構造とすることで一層の高密度収納が実現される。加えて、光接続部の差し替え作業などの際、主トレー自体を前方に引き出す必要はない。その際、主トレー前方に補助トレーを吊り下げた状態、つまり補助トレーを垂直に沿った向きに配置させることができ、主トレー前方のスペースが小さい場合でも作業性が阻害されることはない。

【００２７】

【発明の実施の形態】以下、本発明の実施の形態を説明する。図１は本発明光配線盤の扉を開けた状態の正面図、図２は同側面図、図３は光接続モジュール収納トレーの斜視図、図４は収納トレー内を示す平面図、図５は光接続モジュールの斜視図である。

【００２８】この光配線盤は、図1に示すように、収納ケース10内に複数の収納トレー2を積層配置した構造である。収納トレー20は、図２、３に示すように、その前方を低く、後方を高くして配置され、収納トレー20の前方を上下方向に回動するように収納トレー20の後端に沿った軸を回転軸とする第１回転機構30を介して収納ケース内に取り付けられている。

【００２９】各収納トレー20は下段の主トレー21と、上段の補助トレー22とから構成されており、各トレー21,22内に光接続モジュールケース40が収納されている（図３）。これら主トレー21と補助トレー22の動作については後に詳細に説明する。

【００３０】収納ケース10内に導入された多芯光ファイバケーブル（線路側光ファイバ50）は、そのまま上方に引き上げられ、図１の左側から収納トレーの主トレー21に導入され、同左側から装置側光ファイバ52が引き出される。収納トレー内部での線路側光ファイバ50、多芯光ファイバ芯線51および装置側光ファイバ52の取り回し状態を図４に示す。

【００３１】図４は上段の補助トレー22を下段の主トレー21からスライド回転させてずらした状態の平面図である。主トレー21の一方の側壁には、線路側光ファイバ50の導入口23が形成されており、ここから線路側光ファイバ50が主トレー内に導入される。導入された線路側光ファイバ50は、その一部が主トレー内で多芯光ファイバ芯線51の非分岐端と融着接続される。残部の線路側光ファイバ50は、補助トレーの底面の一部に形成された切欠26を経て補助トレー側に導入され、同様に多芯光ファイバ芯線51の非分岐端と融着接続される。主（補助）トレー内には融着接続部53を保持するホルダ24が設けられ、各融着接続部53はホルダ24に保持される。ホルダ24は樋状の溝を並列した構成で、筒状の融着接続部53をホルダ24の溝にはめ込むことで保持する。

【００３２】また、多芯光ファイバ芯線51は各トレー21，22内で若干の余長をとって、各光接続モジュールケース40に導入する。本例では一つの主（補助）トレー21、22に５つの光接続モジュールケース40を並列して固定した。また、光接続モジュールケース40は、接続アダプタ42（図５）が主（補助）トレー21、22の底面に沿う方向、すなわち横置きとして配置している。

【００３３】光接続モジュールの構成を図５に示す。光接続モジュールは、薄い矩形のケース状のもので、モジュールケース40の一端に多芯光ファイバ芯線の導入口41を有し、他端に接続アダプタ42を具えている。導入口41から引き入れられた多芯光ファイバ芯線51は、環状の余長収納部43に巻き付けられ、単芯分岐されて接続アダプタ42の一面（モジュールケース内側）につなげられる。接続アダプタ42の他面（モジュールケース外側）は、コネクタ54を差し込むことで装置側光ファイバ52を接続できるように構成されている。本例では、８芯の装置側光ファイバ52をコネクタ接続できる接続アダプタ42とした。図５では装置側光ファイバ52は1本のみ示し、他は省略している。

【００３４】ここで、光接続モジュールケース40の一端は、ヒンジ60（回動機構）を介して主（補助）トレー21、22の底面に固定した。このヒンジ60は、モジュールケース40の接続アダプタ側を任意の角度に起こした状態（二点鎖線表示）に保持できるもので、例えば株式会社タキゲン製B-1109-3を利用することができる。これにより、通常はモジュールケース40のアダプタ側を倒した状態で収納トレー内にモジュールケース40を収納しておく。また、装置側光ファイバのコネクタ54を差し替えなどする場合は、接続アダプタ側を所定の角度に起こすことでコネクタ54を上下からつまむことができ、任意のコネクタ54を作業性良く差し替えすることができる。

【００３５】なお、説明の便宜上、図５ではモジュールケース40の内部構成を示しているが、実際には蓋が被せられている。

【００３６】次に、上下２段構造の収納トレー20の構造と動作を図３、図４、図６、図７に基づいて説明する。図３に示したように、収納トレー20は第１回転機構30を具えているが、さらに第２回転機構70と第３回転機構80を具えている。

【００３７】主トレー21と補助トレー22は、主トレー21の前方角部に設けられた積層方向の回転軸を有する第２回転機構70により連結されている。この第２回転機構70により、図３に示すように主トレー21と補助トレー22とを重ねた状態に保持することができると共に、図４に示すように補助トレー22を主トレー21の前方にスライド回転して引き出すことができる。

【００３８】さらに、補助トレー22を主トレー21の前方に引き出した状態で主トレー21に対する角度を可変するように、主トレー21の前端に沿った軸を回転軸とする第３回転機構80を具える。引き出した補助トレー22の側部は対向する主トレー21の前部に掛け金具27（図３）により掛け止めすることができる。これにより、図６に示すように、補助トレー22を主トレー21の前方にたれ下げた状態に保持することができる。従って、補助トレー22ををほぼ垂直に沿った方向に保持した状態で装置側光ファイバのコネクタ54の切り替え作業を行うことができ、光配線盤の設置個所が通路などで収納トレー20の前方スペースが狭い場合でも十分な作業空間を確保して円滑な作業を行うことができる。

【００３９】実際に最上部以外の収納トレーに対して装置側光ファイバの切り替え作業を行う場合、図７に示す

ように、作業を行う収納トレー20Aよりも上部に位置する全ての収納トレー20Bを第１回転機構30により上方に回動して保持させる。この保持は、収納トレー20の側面に取り付けられた止め金具25を回動してストッパ（図示せず）に掛けることで行われる。

【００４０】作業を行う収納トレー20よりも上部に位置する全ての収納トレー20Bを跳ね上げれば、作業対象の収納トレー20Aの上面が露出する。従って、補助トレー22を第２回転機構70によりスライド回転させて、さらに第３回転機構80により補助トレー22を主トレー21の前方にたれ下げた状態に保持すれば、主トレー21の上面と補助トレー22の上面に作業空間を形成することができる。

【００４１】図８、９に示した従来の光配線盤では、収納トレー数21段、最大1000芯の光接続部（コネクタ）を収納することができるが、本発明光配線盤では、収納ケースのサイズ（780×350×2300㎜）を変えることなく収納トレー数30段、最大2400芯の光接続部（アダプタ）を収納することができる。

【００４２】

【発明の効果】以上説明したように、本発明光配線盤によれば、次の効果を奏することができる。

【００４３】芯線型の光接続モジュールを用いることで、単心ごとのコネクタをトレーに収納する場合に比べてより多数の光ファイバ接続部をトレー内に収納することができる。

【００４４】光接続モジュールをトレー内に固定することで、モジュールを前後に出し入れする必要がなく、この前後動に対応した多芯光ファイバ芯線（コード）の余長も短縮できるため、余長スペースを削減してより一層の多芯収納を実現することができる。

【００４５】光接続モジュールのアダプタが水平トレー底面と水平になる向きにモジュールを並列配置することで、各トレーを薄型に形成することができ、高密度収納に寄与することができる。

【００４６】光接続モジュールの接続アダプタ側を起こした状態に保持するように回動機構を設けることで、接続アダプタに接続される装置側光ファイバコネクタの下方に指を差し入れる空間を形成でき、作業性を改善することができる。

【００４７】光接続モジュールを用いることで、融着接続部をトレー内に収納し、融着接続部前後の余長もトレー内に収納することができる。これに伴って、従来必要であった融着接続部トレーとセンタートレーも不要になり、光接続モジュールを収納するトレーの段数を格段に増加させることができる。

【００４８】収納トレーを主トレーと補助トレーの２段構造とし、第１回転機構による主トレー前方の上下動、第２回転機構による補助トレーのスライド回転、第３回転機構による補助トレーの回転を行うことで、光接続部の高密度収納と省スペースでの良好な作業性を確保することができる。

【図面の簡単な説明】

【図１】本発明光配線盤の正面図である。

【図２】本発明光配線盤の側面図である。

【図３】光接続モジュール収納トレーの斜視図である。

【図４】収納トレーの内部構成を示す平面図である。

【図５】光接続モジュールの斜視図である。

【図６】補助トレーを主トレーの前方にたれ下げた状態を示す斜視図である。

【図７】補助トレーを主トレーの前方にたれ下げた状態を示す部分側面図である。

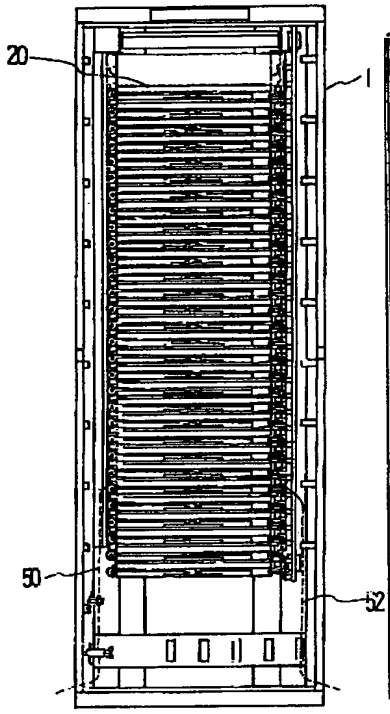
【図８】従来の光配線盤を示す正面図である。

【図９】従来の光配線盤における収納トレー内部を示す平面図である。

【符号の説明】

10　収納ケース
20　収納トレー
20A　収納トレー
20B　収納トレー
21　主トレー
22　補助トレー
23　導入口
24　ホルダ
25　止め金具
26　切欠
27　掛け金具
30　第１回転機構
40　光接続モジュールケース
41　導入口
42　接続アダプタ
43　余長収納部
50　線路側光ファイバ
51　多芯光ファイバ芯線
51′　分岐用光ファイバコード
52　装置側光ファイバ
53　融着接続部
54　コネクタ
60　ヒンジ
70　第２回転機構
80　第３回転機構

【図1】


20
1
50
52

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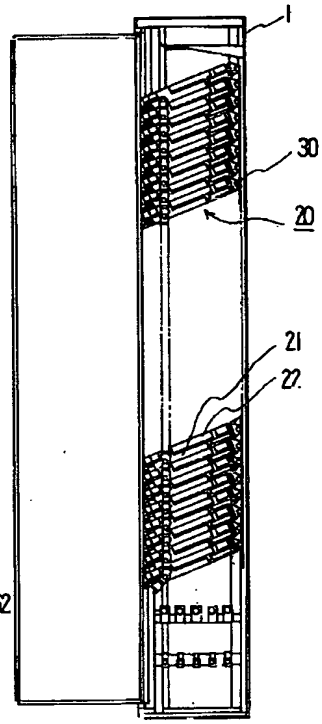
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30
20
21
27

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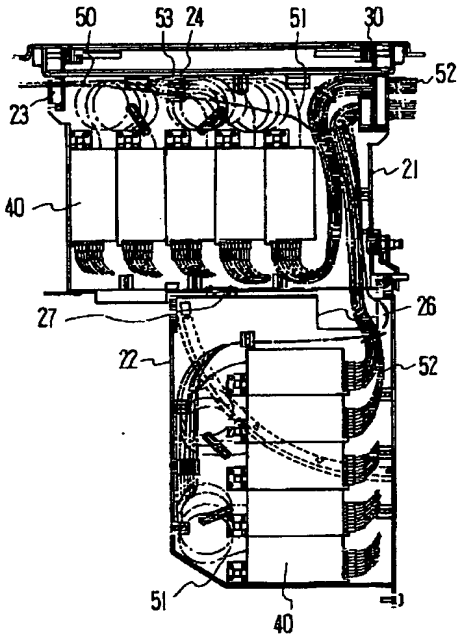
50
53
24
51
30
52
23
21
40
26
27
22
52
51
40

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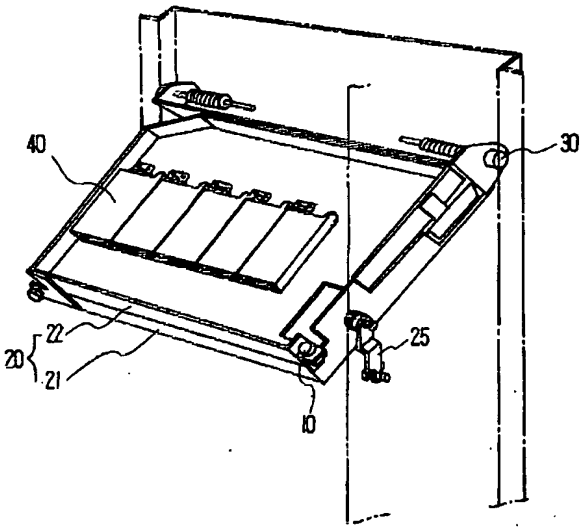
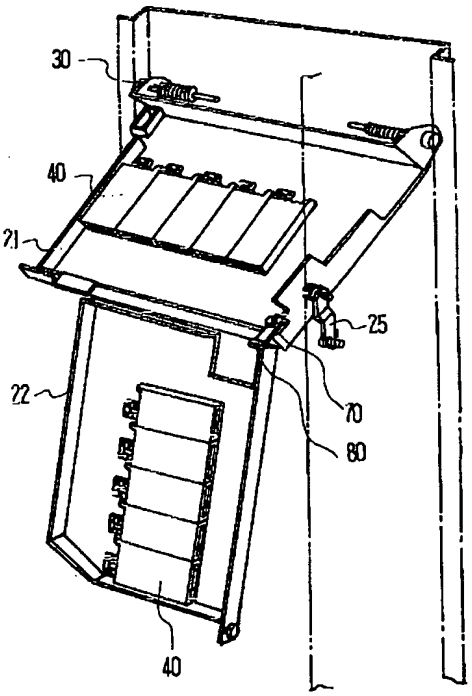
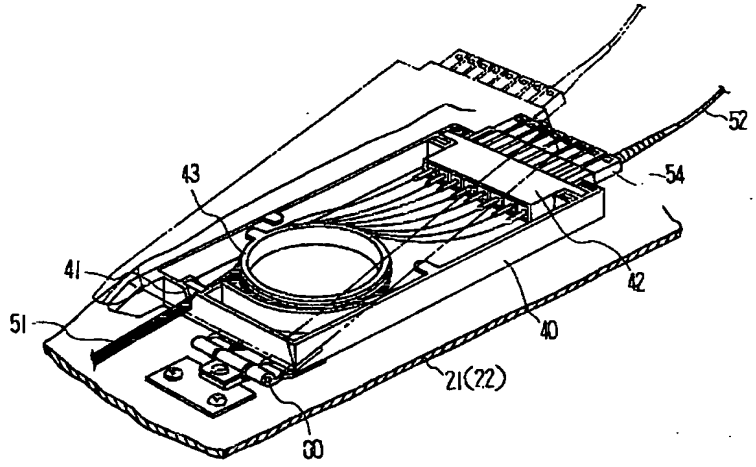

40
30
20
22
21
25
10

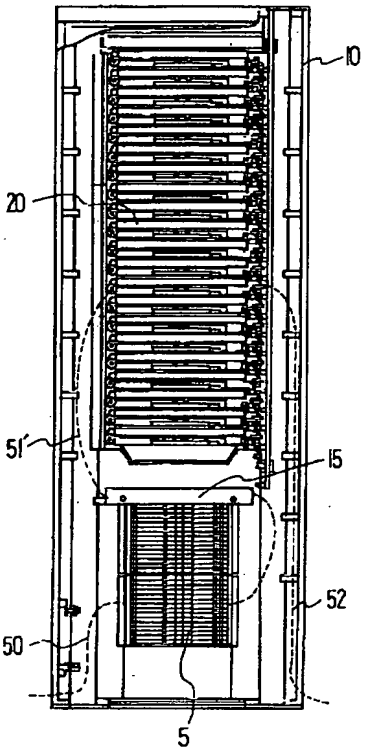
【図6】


30
40
21
25
22
70
80
40

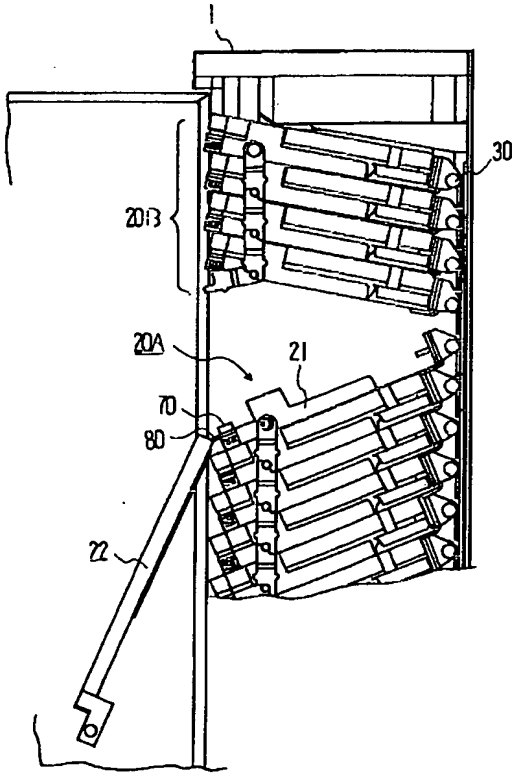
【図5】


52
54
43
41
42
51
40
21(22)
60

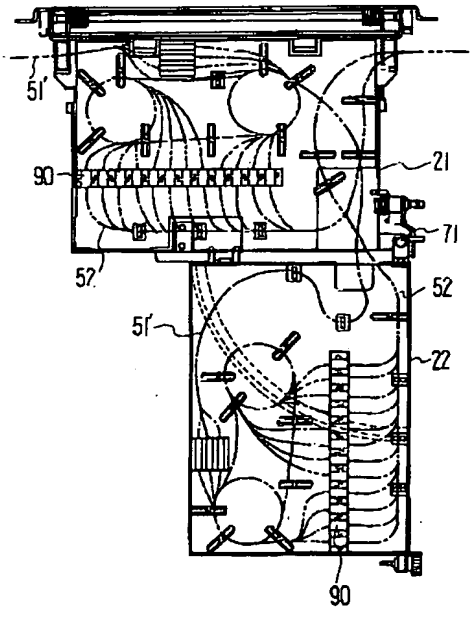
【図8】


10
20
51'
15
52
50
5

【図7】


1
30
20B
20A
21
70
80
22

【図9】


51'
21
90
71
52'
52
51'
22
90

フロントページの続き

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PATENT ABSTRACTS OF JAPAN

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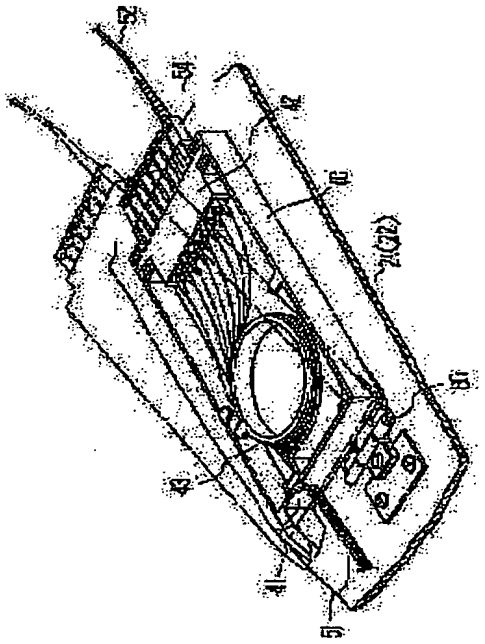
(54) OPTICAL WIRING BOARD

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an optical wiring board which enables the increased number of optical connecting parts to be stored with high density and which excels in workability.
SOLUTION: The optical wiring board is equipped with a tray 21 (22) and a plurality of optical connecting modules 40 in which multiple coated optical fibers 51 are introduced from one end and in which a connecting adaptor 42 is installed on the other end for optical fibers 52 on equipment side. The optical connecting modules 40 are fixed on the tray 21 (22) through a rotary mechanism (hinge 60) so as to hold the connecting adaptor side in a raised state.



LEGAL STATUS

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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] A tray and an end are the optical distributing board which is equipped with an optical connection module equipped with the multicore optical fiber core wire which has the connection adapter by which single fiber branching was carried out by un-branching at the other end, and is characterized by for said optical connection module making a connection adapter parallel with a tray base, and fixing it in said tray.
[Claim 2] An optical connection module is the optical distributing board according to claim 1 characterized by being fixed to a tray through a rotation device so that it may hold in the condition of having started the connection adapter side.
[Claim 3] The optical distributing board according to claim 1 characterized by having the holder which holds a welding connection with the non-branching edge of a track side optical fiber and a multicore optical fiber in said tray.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the optical distributing board for branching and connecting a fiber optic cable at another optical fiber. While being able to contain more optical connections in a compact especially, it is related with the optical distributing board which is excellent also in workability.
[0002]
[Description of the Prior Art] There are a connector mold which connects an optical connection independently the whole single alignment, and a module mold using the connection adapter which carried out termination of two or more hearts collectively in the optical distributing board.
[0003] The connector mold is equipped with the welding connection tray 5, the pin center,large tray 15, and the optical connection receipt tray 20 sequentially from the bottom in the receipt case 10, as shown in drawing 8 . The track side optical fiber 50 (multicore fiber optic cable) is a configuration which is introduced from the left-hand side of drawing and pulls out the equipment side optical fiber 52 from the right-hand side of drawing.
[0004] The track side optical fiber 50 introduced in the case 10 is introduced in the welding connection tray 5. Within the welding connection tray 5, fusion splicing of the track side optical fiber 50 and the non-branching edge of fiber-optic code 51' for branching is carried out, and it is contained with extra length sufficient before and after this connection. Fiber-optic code 51' for branching pulled out from the welding connection tray 5 is introduced from the left-hand side of drawing through the pin center,large tray 15 to the receipt tray 20. Fiber-optic code 51' for branching is once introduced into the receipt tray 20 from the left-hand side of drawing through the pin center,large tray 15 for pulling out the equipment side optical fiber 52 from the right-hand side of drawing, and classifying it with the track side optical

fiber 50.
[0005] As shown in drawing 9 , the receipt tray 20 is constituted by two steps of upper and lower sides, and the upper case tray 21 is connected free [rotation] with the revolving shaft 71 located in the front corner of a lower-berth tray. This rotates so that the upper case tray 21 may be slid, and it is constituted so that it can pull out ahead of the lower-berth tray 22.
[0006] Fiber-optic code 51' for branching takes said vertical stage tray 21 and extra length sufficient within 22, and is contained, and the branching edge is connected to the equipment side optical fiber 52 of a single alignment through the connector 90 which became independent respectively. There is JP,10-339823,A as reference which indicates the same configuration as this optical distributing board.
[0007] On the other hand, a module mold has the thing of a publication in JP,11-133246,A. Generally, an optical connection module is the thing of the shape of a thin case, and the module case had the non-branching multicore optical fiber core wire or the introductory hole of a multicore fiber-optic code at the end, and equips the other end with the optical connection adapter by which single fiber branching was carried out. After the multicore optical fiber core wire (code) introduced in the module case takes extra length, single fiber branching is carried out and it is connected to a connection adapter. Said adapter is constituted so that the connector joint of the equipment side optical fiber can be carried out.
[0008] Usually, such a module is carried out longitudinally, namely, a connection adapter is turned to along a perpendicular direction, and it arranges them in parallel, and it is constituted so that only the module for an activity may be pulled out ahead and the optical fiber for devices may be taken out and inserted. [two or more]
[0009]
[Problem(s) to be Solved by the Invention] However, in the conventional optical distributing board, there was a problem said that it is difficult to carry out densification of the number of the optical connections contained to the optical distributing board.
[0010] It is because activity spacing for taking out and inserting an extra length tooth space and each connector is needed and the number of the optical connections contained is restrained, in order to contain the top which the big extra length of fiber-optic code 51' for branching needs in a <case of connector mold> tray and to contain the connector 90 for every single alignment in a tray. Moreover, the storing tooth space of the welding connection tray 5 and the pin center,large tray 15 is required, therefore it also becomes the failure of densification that the number of storing of the

optical connection receipt tray 20 is restrained.
[0011] Since a <case of module mold> adapter is arranged so that it may meet perpendicularly, and it is constituted free [a drawer] forward and backward, sufficient extra length for corresponding to drawer actuation is required. Therefore, a big extra length tooth space is needed, and high density receipt of an optical connection is difficult. Moreover, the point which needs a welding connection tray also about the case of the conventional module mold is the same as that of the case of a connector mold.
[0012] Therefore, the key objective of this invention is to offer the optical distributing board which can contain more optical connections to high density, and is excellent in workability.
[0013]
[Means for Solving the Problem] An optical connection module is used for this invention, and it attains the above-mentioned purpose with devising the arrangement structure in the tray of this module.
[0014] That is, this invention light distributing board is equipped with a tray and an optical connection module. An optical connection module is equipped with the multicore optical fiber core wire with which an end has the connection adapter by which single fiber branching was carried out by un-branching at the other end. And this optical connection module is characterized by making a connection adapter parallel with a tray base, and fixing in said tray.
[0015] By using an optical connection module, many optical fiber connections can be contained more in a tray compared with the case where the connector for every single alignment is contained on a tray.
[0016] Moreover, by fixing this module in a tray, since it is not necessary to take a module in and out forward and backward and the extra length of the optical fiber for branching corresponding to this longitudinal slide movement can also be shortened, extra length tooth spaces can be reduced and much more multicore receipt can be realized.

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TECHNICAL FIELD

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PRIOR ART

[Description of the Prior Art] There are a connector mold which connects an optical connection independently the whole single alignment, and a module mold using the connection adapter which carried out termination of two or more hearts collectively in the optical distributing board.
[0003] The connector mold is equipped with the welding connection tray 5, the pin center,large tray 15, and the optical connection receipt tray 20 sequentially from the bottom in the receipt case 10, as shown in drawing 8 . The track side optical fiber 50 (multicore fiber optic cable) is a configuration which is introduced from the left-hand side of drawing and pulls out the equipment side optical fiber 52 from the right-hand side of drawing.
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[0005] As shown in drawing 9 , the receipt tray 20 is constituted by two steps of upper and lower sides, and the upper case tray 21 is connected free [rotation] with the revolving shaft 71 located in the front corner of a lower-berth tray. This rotates so that the upper case tray 21 may be slid, and it is constituted so that it can pull out ahead of the lower-berth tray 22.
[0006] Fiber-optic code 51' for branching takes said vertical stage tray 21 and extra length sufficient within 22, and is contained, and the branching

edge is connected to the equipment side optical fiber 52 of a single alignment through the connector 90 which became independent respectively. There is JP,10-339823,A as reference which indicates the same configuration as this optical distributing board.

[0007] On the other hand, a module mold has the thing of a publication in JP,11-133246,A. Generally, an optical connection module is the thing of the shape of a thin case, and the module case had the non-branching multicore optical fiber core wire or the introductory hole of a multicore fiber-optic code at the end, and equips the other end with the optical connection adapter by which single fiber branching was carried out. After the multicore optical fiber core wire (code) introduced in the module case takes extra length, single fiber branching is carried out and it is connected to a connection adapter. Said adapter is constituted so that the connector joint of the equipment side optical fiber can be carried out.

[0008] Usually, such a module is carried out longitudinally, namely, a connection adapter is turned to along a perpendicular direction, and it arranges them in parallel, and it is constituted so that only the module for an activity may be pulled out ahead and the optical fiber for devices may be taken out and inserted. [two or more]

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention light distributing board, the following effectiveness can be done so as explained above.
[0043] By using the optical connection module of a core wire mold, many optical fiber connections can be contained more in a tray compared with the case where the connector for every single alignment is contained on a tray.
[0044] By fixing an optical connection module in a tray, since it is not necessary to take a module in and out forward and backward and the extra length of the multicore optical fiber core wire (code) corresponding to this longitudinal slide movement can also be shortened, extra length tooth spaces can be reduced and much more multicore receipt can be realized.
[0045] By carrying out the parallel arrangement of the module to the sense which becomes level on a level tray base, the adapter of an optical connection module can form each tray in a thin shape, and can contribute to high density receipt.
[0046] By establishing a rotation device, the space which inserts a finger under the equipment side optical connector connected to a connection adapter can be formed so that it may hold in the condition of having started the connection adapter side of an optical connection module, and workability can be improved.
[0047] By using an optical connection module, a welding connection can be contained in a tray and the extra length before and behind a welding connection can also contain in a tray. the welding connection tray and pin center,large tray which were the need conventionally also become unnecessary, and the number of stages of the tray which contains an optical connection module can be boiled markedly, and can be made to increase in connection with this
[0048] A receipt tray can be made into the two-step structure of the main tray and an auxiliary tray, and high density receipt of an optical connection, and space-saving and good workability can be secured by rotating the

auxiliary tray by vertical movement ahead of [by the 1st rolling mechanism] the main tray, slide rotation of the auxiliary tray by the 2nd rolling mechanism, and the 3rd rolling mechanism.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the conventional optical distributing board, there was a problem said that it is difficult to carry out densification of the number of the optical connections contained to the optical distributing board.
[0010] It is because activity spacing for taking out and inserting an extra length tooth space and each connector is needed and the number of the optical connections contained is restrained, in order to contain the top which the big extra length of fiber-optic code 51' for branching needs in a <case of connector mold> tray and to contain the connector 90 for every single alignment in a tray. Moreover, the storing tooth space of the welding connection tray 5 and the pin center,large tray 15 is required, therefore it also becomes the failure of densification that the number of storing of the optical connection receipt tray 20 is restrained.
[0011] Since a <case of module mold> adapter is arranged so that it may meet perpendicularly, and it is constituted free [a drawer] forward and backward, sufficient extra length for corresponding to drawer actuation is required. Therefore, a big extra length tooth space is needed, and high density receipt of an optical connection is difficult. Moreover, the point which needs a welding connection tray also about the case of the conventional module mold is the same as that of the case of a connector mold.
[0012] Therefore, the key objective of this invention is to offer the optical distributing board which can contain more optical connections to high density, and is excellent in workability.

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MEANS

[Means for Solving the Problem] An optical connection module is used for this invention, and it attains the above-mentioned purpose with devising the arrangement structure in the tray of this module.
[0014] That is, this invention light distributing board is equipped with a tray and an optical connection module. An optical connection module is equipped with the multicore optical fiber core wire with which an end has the connection adapter by which single fiber branching was carried out by un-branching at the other end. And this optical connection module is characterized by making a connection adapter parallel with a tray base, and fixing in said tray.
[0015] By using an optical connection module, many optical fiber connections can be contained more in a tray compared with the case where the connector for every single alignment is contained on a tray.
[0016] Moreover, by fixing this module in a tray, since it is not necessary to take a module in and out forward and backward and the extra length of the optical fiber for branching corresponding to this longitudinal slide movement can also be shortened, extra length tooth spaces can be reduced and much more multicore receipt can be realized. Conventionally, in the optical distributing board of a connector mold, a big extra length tooth space is needed before and behind the branching part of the fiber-optic code for branching before and after a welding connection. In this invention light distributing board, by using an optical connection module, the extra length before and behind the welding connection of a track side optical fiber and a multicore optical fiber core wire can be contained in a tray, and extra length tooth spaces can be reduced.
[0017] Furthermore, each tray can be formed in a thin shape by arranging a module to the sense to which an adapter becomes level on a level tray base. Any of the combination of juxtaposition and a column, or both are sufficient as arrangement structure.

[0018] Here, since the connector joint of the equipment side optical fiber of a single alignment is carried out, the activity which takes out and inserts each equipment side optical connector to an adapter is needed for a connection adapter. It is desirable to open spacing between a connection adapter and a tray base, and to fix a module so that this activity can be done easily. The size of extent which can insert a finger is suitable for this spacing. As for formation of this spacing, making supporter material placed between module bases, or forming a crevice in ** tray base etc. is mentioned so that ** connection adapter side may become high, the longitudinal section at the base of a module may be made into the shape of a taper or ** connection adapter side may become high. On the other hand, when not forming the aforementioned spacing, as for extraction and insertion with a connection adapter and the connector of an equipment side optical fiber, it is desirable to carry out using the fixture which engages with the edge of a connector.

[0019] Moreover, as for an optical connection module, it is desirable to fix to a tray through a rotation device so that it may hold in the condition of having started the connection adapter side. If a connection adapter side can be started from a tray base, the space which inserts a finger under the equipment side optical connector can be formed, and a extraction-and-insertion activity can be easily done on both sides of the connector of an equipment side optical fiber with a finger from the upper and lower sides. On the contrary, when not working, a module can be made close to a tray base, the height of the module in a tray can be held down to min, and thickness of the tray itself can be made small.

[0020] It is suitable to use a hinge, in order to hold in the condition of having started the connection adapter side. What set up the switching action firmly using elastic material, and the usual thing to which a switching action is performed smoothly are in a hinge. If an optical connection module is only raised even if it does not use any device, when the former is used, it will be held in the condition. On the other hand, only by raising an optical connection module, when the latter is used, in order to return to the condition that origin was pushed down, it is desirable to arrange the support saddle in which **** is free on the modular inferior surface of tongue, and to hold a modular standing-up condition by this support saddle.

[0021] An optical connection module is arranged by the monolayer in a tray. Thereby, thickness of one step of tray is made small, and high density receipt is enabled by arranging the tray of an a large number stage more.

[0022] Moreover, it is desirable to have a holder holding the welding connection of a track side optical fiber and a multicore optical fiber core wire

in a tray. By using an optical connection module, the extra length connected with a welding connection can be contained in a tray. Therefore, the welding connection tray and pin center,large tray which were the need conventionally also become unnecessary, arrange the tray which contains a module also to a part for the tooth space of a welding connection and a rate pin center,large tray, and enable high density receipt. That is, a track side optical fiber can be introduced into the receipt tray of a direct module, without letting a welding connection tray and a pin center,large tray pass.
[0023] Although it is also possible to apply to the conventional tray structure of doing a change activity where the tray of level arrangement is pulled out ahead, as for arrangement of the optical connection module in this invention light distributing board, it is desirable from a viewpoint of the formation of multicore receipt, and workability to apply to the tray of a laminated structure equipped with three rolling mechanisms.
[0024] The tray of this laminated structure is equipped with the auxiliary tray which carried out the laminating on the main tray and the main tray, and an optical connection module is contained by each of both trays. And it has the following three rolling mechanisms.
[0025] ** The 1st rolling mechanism which sets a revolving shaft as the shaft which met the back end of the main tray so that the front of a main tray might be rotated in the vertical direction.
** The 2nd rolling mechanism which sets a revolving shaft as the shaft of the direction of a laminating so that it rotates ahead of the main tray, and an auxiliary tray may be pulled out and may be made.
** The 3rd rolling mechanism which sets a revolving shaft as the shaft which met the front end of the main tray so that it might carry out adjustable [of the include angle to the main tray], where an auxiliary tray is pulled out ahead of the main tray.
[0026] If the tray of such a laminated structure is used, much more high density receipt will be realized by making a tray into a laminated structure. In addition, it is not necessary to pull out the main tray itself ahead in the cases, such as a substitution activity of an optical connection. In that case, the condition which hung the auxiliary tray ahead [main tray], i.e., an auxiliary tray, can be arranged to the sense which met perpendicularly, and even when the tooth space ahead of the main tray is small, workability is not checked.
[0027]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained. The front view in the condition that drawing 1 opened the door of this invention light distributing board, the top view, in which in

drawing 2 this side elevation and drawing 3 show the perspective view of an optical connection module receipt tray, and drawing 4 shows the inside of a receipt tray, and drawing 5 are the perspective views of an optical connection module.

[0028] This optical distributing board is the structure which carried out laminating arrangement of two or more receipt trays 2 into the receipt case 10, as shown in drawing 1. As shown in drawing 2 and 3, the receipt tray 20 is low in the front, makes back high, is arranged, and is attached in the receipt case through the 1st rolling mechanism 30 which sets a revolving shaft as the shaft which met the back end of the receipt tray 20 so that the front of the receipt tray 20 might be rotated in the vertical direction.

[0029] Each receipt tray 20 consists of a main tray 21 of the lower berth, and an auxiliary tray 22 of an upper case, and the optical connection module case 40 is contained in each tray 21 and 22 (drawing 3 R> 3). Actuation of these main trays 21 and the auxiliary tray 22 is later explained to a detail.

[0030] The multicore fiber optic cable (track side optical fiber 50) introduced in the receipt case 10 can be pulled up up as it is, it is introduced into the main tray 21 of a receipt tray from the left-hand side of drawing 1 , and the equipment side optical fiber 52 is pulled out from this left-hand side. The management condition of the track side optical fiber 50 inside a receipt tray, the multicore optical fiber core wire 51, and the equipment side optical fiber 52 is shown in drawing 4 .

[0031] Drawing 4 is a top view in the condition of having carried out slide rotation and having shifted the auxiliary tray 22 of an upper case from the main tray 21 of the lower berth. The inlet 23 of the track side optical fiber 50 is formed in one side attachment wall of the main tray 21, and the track side optical fiber 50 is introduced in the main tray from here. As for the introduced track side optical fiber 50, fusion splicing of the part is carried out to the non-branching edge of the multicore optical fiber core wire 51 within the main tray. The track side optical fiber 50 of the remainder is introduced into an auxiliary tray side through the notching 26 formed in a part of base of an auxiliary tray, and fusion splicing is similarly carried out to the non-branching edge of the multicore optical fiber core wire 51. In the main (assistance) trays, the holder 24 holding the welding connection 53 is formed, and each welding connection 53 is held at a holder 24. A holder 24 is the configuration which arranged the gutter-shaped slot in parallel, and it holds by inserting the tubed welding connection 53 in the slot of a holder 24.

[0032] Moreover, the multicore optical fiber core wire 51 takes some extra

length within each tray 21 and 22, and introduces him into each optical connection module case 40. In this example, five optical connection module cases 40 were arranged in parallel on the one main (assistance) trays 21 and 22, and it fixed to them. Moreover, the optical connection module case 40 is arranged as every direction where the connection adapter 42 (drawing 5) is along the base of the main (assistance) trays 21 and 22, i.e., width.

[0033] The configuration of an optical connection module is shown in drawing 5 . An optical connection module is the thing of the shape of a case of a thin rectangle, had the inlet 41 of a multicore optical fiber core wire at the end of the module case 40, and equips the other end with the connection adapter 42. It is twisted around the annular extra length section 43, single fiber branching is carried out, and the multicore optical fiber core wire 51 drawn in from the inlet 41 is tied to the whole surface (module case inside) of the connection adapter 42. It is constituted so that the equipment side optical fiber 52 can be connected by the thing of the connection adapter 42 for which a connector 54 is inserted on the other hand (module case outside). In this example, it considered as the connection adapter 42 which can carry out the connector joint of the equipment side optical fiber 52 of the 8 heart. In drawing 5 , an example and others are omitting one equipment side optical fiber 52.

[0034] Here, the end of the optical connection module case 40 was fixed to the base of the main (assistance) trays 21 and 22 through the hinge 60 (rotation device). This hinge 60 can be held in the condition (two-dot chain line display) of having started the connection adapter side of the module case 40 at the include angle of arbitration, and can use made in [B-1109-3] Taki, Inc. Genn. This contains the module case 40 in the receipt tray, where the adapter side of the module case 40 is usually pushed down. Moreover, when substitution etc. carries out the connector 54 of an equipment side optical fiber, a connector 54 can be pinched from the upper and lower sides by starting a connection adapter side at a predetermined include angle, and the connector 54 of arbitration can be substituted with sufficient workability.

[0035] In addition, although the expedient top of explanation and drawing 5 show the internal configuration of the module case 40, the lid is put in fact.

[0036] Next, the structure of the receipt tray 20 of 2 steps of vertical structure and actuation are explained based on drawing 3 , drawing 4 , drawing 6 , and drawing 7 . Although the receipt tray 20 is equipped with the 1st rolling mechanism 30 as shown in drawing 3 , it has the 2nd rolling mechanism 70 and the 3rd rolling mechanism 80 further.

[0037] The main tray 21 and the auxiliary tray 22 are connected by the 2nd

rolling mechanism 70 which has the revolving shaft of the direction of a laminating established in the front corner of the main tray 21. By this 2nd rolling mechanism 70, as shown in drawing 3 , while being able to hold in the condition of having piled up the main tray 21 and the auxiliary tray 22, as shown in drawing 4 , ahead [of the main tray 21], slide rotation can be carried out and the auxiliary tray 22 can be pulled out.

[0038] Furthermore, it has the 3rd rolling mechanism 80 which sets a revolving shaft as the shaft which met the front end of the main tray 21 so that it may carry out adjustable [of the include angle to the main tray 21], where the auxiliary tray 22 is pulled out ahead of the main tray 21. The flank of the pulled-out auxiliary tray 22 can be hung on the anterior part of the main tray 21 which counters by the shackle 27 (drawing 3), and can carry out a stop to it. Thereby, as shown in drawing 6 , it can hold in the condition of having hung down the auxiliary tray 22 ahead of the main tray 21, and having lowered it. Therefore, where auxiliary tray 22 ** is held in the direction met almost perpendicularly, the change activity of the connector 54 of an equipment side optical fiber can be done, and the installation part of the optical distributing board can secure workspace sufficient even when the front tooth space of the receipt tray 20 is narrow at a path etc., and can do a smooth activity.

[0039] When actually doing the change activity of an equipment side optical fiber to receipt trays other than the topmost part, it rotates up by the 1st rolling mechanism 30, and all receipt tray 20B located above receipt tray 20A which works is made to hold, as shown in drawing 7 . This maintenance is performed by rotating the fastening plate 25 attached in the side face of the receipt tray 20, and hanging on a stopper (not shown).

[0040] If all receipt tray 20B located above the receipt tray 20 which works has been bounded, the top face of receipt tray 20A for an activity will be exposed. Therefore, slide rotation of the auxiliary tray 22 is carried out by the 2nd rolling mechanism 70, and workspace can be formed in the top face of the main tray 21, and the top face of the auxiliary tray 22 if it holds in the condition of having hung down the auxiliary tray 22 ahead of the main tray 21 by the 3rd rolling mechanism 80 further, and having lowered.

[0041] With drawing 8 and the conventional optical distributing board shown in 9, although 21 steps of receipt tray numbers and the optical connection (connector) of the a maximum of 1000 heart can be contained, with this invention light distributing board, 30 steps of receipt tray numbers and the optical connection (adapter) of the a maximum of 2400 heart can be contained, without changing the size (780x350x2300mm) of a receipt case.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the front view of this invention light distributing board.
[Drawing 2] It is the side elevation of this invention light distributing board.
[Drawing 3] It is the perspective view of an optical connection module receipt tray.
[Drawing 4] It is the top view showing the internal configuration of a receipt tray.
[Drawing 5] It is the perspective view of an optical connection module.
[Drawing 6] It is the perspective view showing the condition of having hung down the auxiliary tray ahead of the main tray, and having lowered it.
[Drawing 7] It is the partial side elevation showing the condition of having hung down the auxiliary tray ahead of the main tray, and having lowered it.
[Drawing 8] It is the front view showing the conventional optical distributing board.
[Drawing 9] It is the top view showing the interior of a receipt tray in the conventional optical distributing board.
[Description of Notations]
10 Receipt Case
20 Receipt Tray
20A Receipt tray
20B Receipt tray
21 The Main Tray
22 Auxiliary Tray
23 Inlet
24 Holder
25 Fastening Plate
26 Notching
27 Shackle
30 1st Rolling Mechanism

40 Optical Connection Module Case
41 Inlet
42 Connection Adapter
43 Extra Length Section
50 Track Side Optical Fiber
51 Multicore Optical Fiber Core Wire
The fiber-optic code for 51' branching
52 Equipment Side Optical Fiber
53 Welding Connection
54 Connector
60 Hinge
70 2nd Rolling Mechanism
80 3rd Rolling Mechanism

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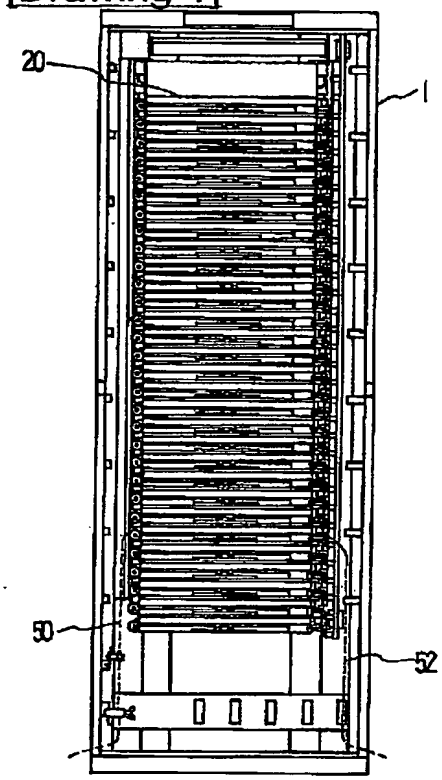
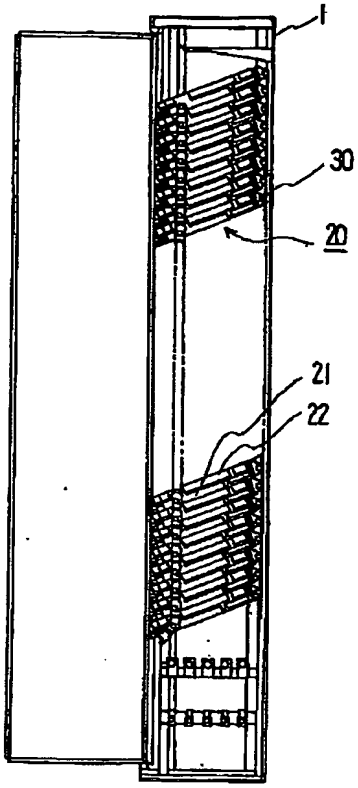
DRAWINGS

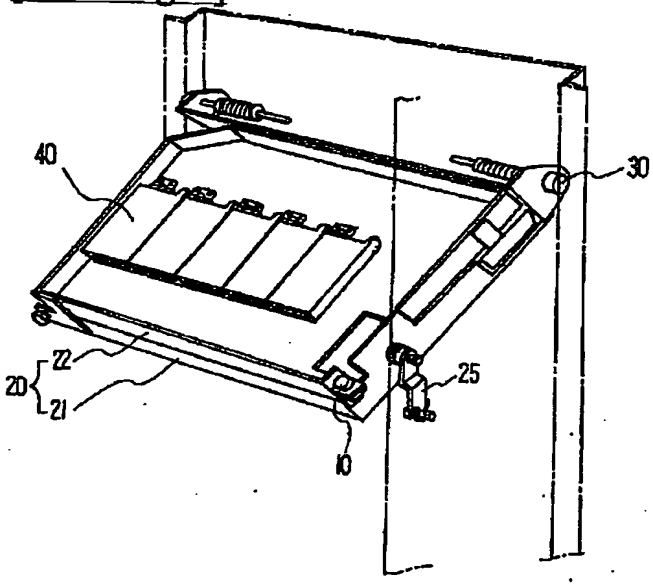
[Drawing 1]



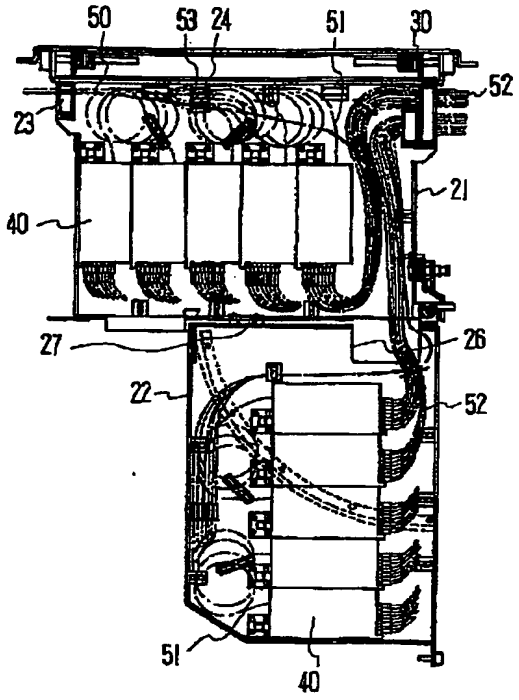
[Drawing 2]



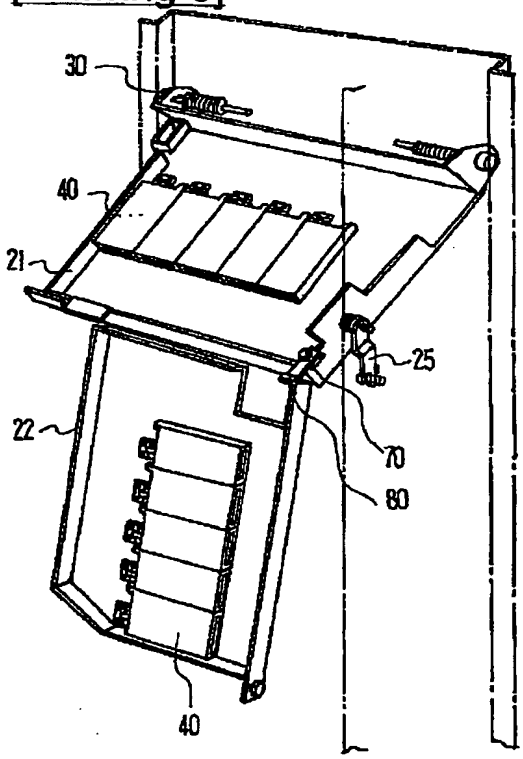
[Drawing 3]



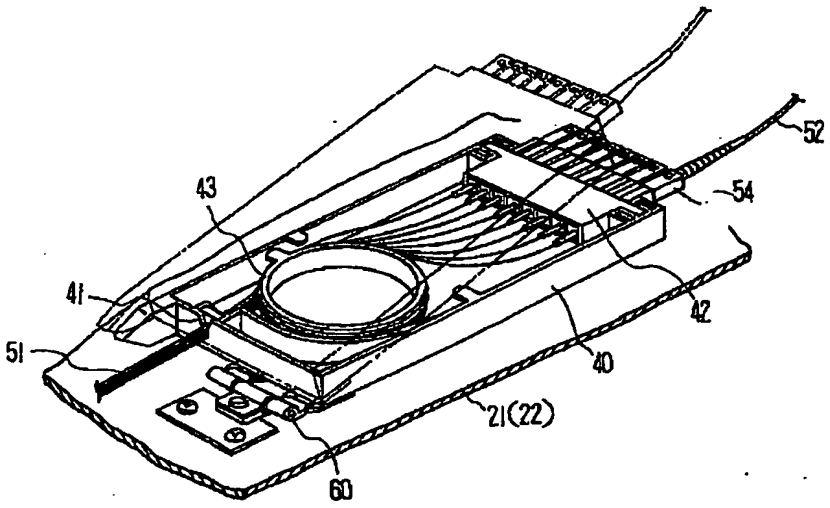
[Drawing 4]



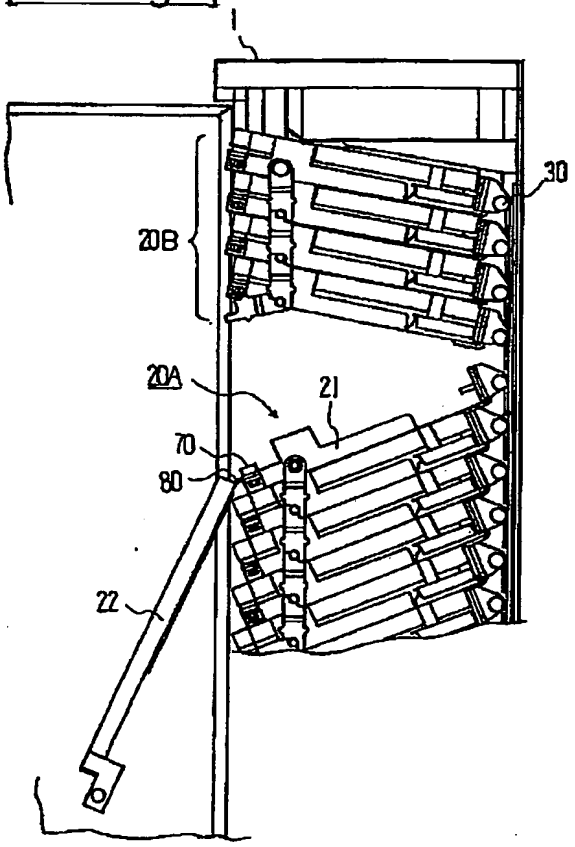
[Drawing 6]



[Drawing 5]



[Drawing 7]



[Drawing 8]

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